



TETRA TECH EM INC.

February 28, 2007

Mr. Roy Crossland
START Project Officer
U.S. Environmental Protection Agency, Region 7
901 North 5th Street
Kansas City, Kansas 66101

**Subject: Draft Hazard Ranking System Scoring Memorandum
United Zinc No. 1, Iola, Kansas
EPA ID: KSN000705026
U.S. EPA Region 7 START 3, Contract No. EP-S7-06-01
Task Order No. 0038.000
Task Monitor: Paul Roemerman, Site Assessment Team Leader**

Dear Mr. Crossland:

Tetra Tech EM Inc. is submitting the attached Hazard Ranking System scoring memorandum and scoresheet for the above-referenced facility. The overall score of 50 was based on the soil migration pathway. If you have any questions or comments, please call the project manager.

Sincerely,

Stephanie Luebbering, CHMM
START Project Manager

Ted Faile, PG, CHMM
START Program Manager

Enclosure

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Superfund

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**PRELIMINARY HAZARD RANKING SYSTEM
UNITED ZINC NO. 1
IOLA, KANSAS**

EPA ID: KSN000705026

Date Scored: February 2007

INTRODUCTION

This draft Hazard Ranking System (HRS) scoring report is for the United Zinc No. 1 (United Zinc) site, located in Iola, Allen County, Kansas. The United Zinc facility is located on the north side of Highway 54 along Kansas Drive, and is the location of the former United Zinc and Chemical Company Zinc and Lead Smelter (United Zinc). This report was developed using HRS guidelines to evaluate groundwater (S_{gw}) migration, surface water (S_{sw}) migration, soil exposure (S_{se}), and air migration (S_{air}) pathways. The groundwater migration, surface water migration, and air migration pathways were not scored due to lack of data. The preliminary score for the site is as follows:

Pathway Score

S_{gw}	=	Not Scored
S_{sw}	=	Not Scored
S_{se}	=	100.00
S_{air}	=	Not Scored
OVERALL HRS SCORE	=	50

The overall site score of 50 is based on the soil exposure pathway. This score is based on lead-contaminated soils, detected at concentrations requiring a time-critical removal action, which exceed the Kansas Department of Health and Environment (KDHE) Risk-Based Standards for Kansas (RSK) Residential Soil Pathway value for lead. Surface soil samples collected during the Preliminary Assessment (PA) provided the analytical data used to score the site.

SITE DESCRIPTION AND HISTORY

The former United Zinc facility is located on the east side of Iola, Allen County, Kansas within a mixture of residential and commercial properties. It is located in Sections 25 and 36 of Township 24 South, Range 18 East (KDHE 2005), as depicted on the U.S. Geological Survey (USGS) 7.5-minute topographic quadrangle map of Iola, Kansas (USGS 1984). The approximate geographic coordinates for the central portion of the facility are 37.9222800 degrees north latitude and 95.385900 degrees west longitude

(Maxim Technologies, Inc. [Maxim] 2003). The location of the facility is shown in Attachment 1, Figure 1.

The former United Zinc smelter facility is comprised of 10 parcels of land, equivalent to approximately 17 acres, but the overall site area evaluated includes a much larger surrounding section. The property has been graded, leveled, and developed since the former smelter operations ceased in the 1920s (Maxim 2003). Most of the property where the former smelter was located is vacant but includes the following businesses: Brenntag Southwest, Inc. (Chemical Distribution Company), a MFA Distributor, the Superflea Flea Market, Tucker's Flea Market, a portion of a concrete mixing facility, and some pastureland (Maxim 2003, KDHE 2005). The facility is bordered on the north by residential properties; on the east by the East Iola Site (the location of the former Prime Western Smelting Company Works No. 3 and J.B. Kirk Gas and Smelting Company), a car wash, a former Tyson processing facility, and a movie theater; on the south by a restaurant, a dry cleaner, a car dealership, and agricultural land; and on the west by the Colberly Site (the location of the former United Iron Works Company), a truck repair facility, and the remaining portion of the concrete mixing facility (Maxim 2003). The facility is also surrounded by residential neighborhoods and two schools (KDHE 2005). The Iola Preschool for the Exceptional (Iola Preschool) is located northeast of United Zinc, and the McKinley Elementary School (McKinley School) is located southwest of United Zinc (Terranext 2005). The facility layout is shown in Attachment 1, Figure 2.

According to the historic plat maps and Sanborn fire insurance maps, activities at the United Zinc facility began as early as 1901. At that time, the facility was called the Standard Acid Company and included three furnaces, 12 retorts, and a pottery room with kilns. Mr. William Lanyon owned the property between 1901 and 1902. The property was transferred to United Zinc in 1902. United Zinc and Chemical Company owned and operated the primary zinc smelter until approximately 1912. No known active smelting facilities were documented on the property after 1912. Historical documentation indicates that the United Zinc facility contained four furnaces, eight kilns, 14 retorts and several ore crushers and roasters (KDHE 2005). The United Zinc facility was designed to capture the sulfur dioxide fumes generated during roasting the ore to make sulfuric acid; therefore, United Zinc likely utilized the acid chambers associated with the Standard Acid facility (KDHE 2006).

During the 2003 Phase I site reconnaissance, smelter waste was observed at United Zinc, and the quantity was estimated as approximately 1,800 cubic yards, concentrated in the southwest corner of the vacant property at United Zinc (Burns & McDonnell Engineering Company, Inc. [Burns & McDonnell] 2004,

Terranext 2005). According to historical documents of the zinc smelting industry, smelting operations were known to generate large amounts of soot from burning coal, which was generally contaminated with elevated levels of lead, cadmium, arsenic, and zinc. In addition, the smelting operations generated large volumes of smelter waste, including impure smelting slag and slag blown from the retorts at the end of the smelting process. Most of the solid waste generated during these operations was left after the smelters closed for future generations to address (KDHE 2006). Sampling of the soil, groundwater, sediment, surface water, smelter waste, and surrounding areas began in 2004 to determine the potential impact from the former smelting operations at United Zinc.

PREVIOUS INVESTIGATIONS

A Phase I Focused Former Smelter Assessment (FFSA) was completed on behalf of the KDHE State Water Plan (SWP) program in December 2003. The FFSA identified a Recognized Environmental Condition (REC) at United Zinc based on observation of smelter waste during the site reconnaissance. The smelter waste appeared to have impacted the vegetative growth in the area of the former smelter operations. In addition, elevated concentrations of lead in the surface soils on the property immediately adjacent to United Zinc had been previously documented from other smelting operations, including the East Iola Site and the Colberly Site. A Phase II Assessment was recommended at United Zinc to investigate the potential risk of human exposure to heavy metal-impacted waste and surface soil, and in the surrounding area from the smelting activities (Maxim 2003).

Sampling of the soil, smelter waste, groundwater, surface water and sediment was conducted during the Phase II FFSA at United Zinc in December 2004 on behalf of the KDHE SWP. The sampling identified elevated levels of arsenic, cadmium, lead, and zinc above their background soil sample concentrations. The Phase II FFSA also indicated potential contamination near residents and at both the McKinley School and the Iola Preschool (Burns & McDonnell 2004, KDHE 2005).

KDHE collected samples in June 2005 from 50 residential yards located between United Zinc and the McKinley School and the Iola Preschool. Arsenic was detected above its KDHE Risk-Based Standards for Kansas (RSK) Residential Soil Pathway level of 11 milligrams per kilogram (mg/kg) in 18 of the residential samples (Terranext 2005, KDHE 2003). In addition, lead was found above its KDHE RSK Residential Soil Pathway level of 800 mg/kg in 12 of the residential samples, some of the same samples with elevated arsenic concentrations. Cadmium and zinc were detected in all of the soil samples at concentrations below their KDHE RSK Residential Soil Pathway values (Terranext 2005; KDHE 2003, 2005).

A Preliminary RSE was conducted by KDHE in September 2005. In support of the 2005 RSE, KDHE collected additional samples from sensitive receptor areas near United Zinc, including the McKinley School and Iola Preschool. The results exhibited elevated levels of arsenic, cadmium, lead, and zinc at residential and non-residential properties. The presence of lead above 400 mg/kg was also identified within the McKinley School playground and adjacent areas. The Preliminary RSE recommended further removal site evaluation and removal action consideration (KDHE 2005).

Tetra Tech, under contract to the EPA, prepared a RSE report in September 2006. The sampling activities for the RSE were conducted during April and May 2006. During the RSE, approximately 260 properties were screened for lead using a XRF, and approximately 10 percent of the screened samples were submitted for laboratory confirmation analyses for arsenic, barium, cadmium, lead, and zinc. Thirty-four properties were identified where either the XRF and/or laboratory data indicated lead concentrations warranting a time-critical removal action (400 mg/kg for schools and daycares; 800 mg/kg for residential properties; and 1,000 mg/kg for commercial properties). The 34 properties included 19 private residences, 10 daycare facilities, two elementary schools, and three commercial properties (Tetra Tech 2006a).

PA SAMPLING

Since June 2006, Tetra Tech in support of EPA, has been screening residential properties for possible lead contamination. Tetra Tech prepared two site-specific Quality Assurance Project Plans (QAPP) for United Zinc. The first QAPP was written for the integrated RSE/PA sampling activities and the second QAPP was written for the RA sampling activities. The QAPPS were approved by EPA subsequent to their submission in April and August 2006 (Tetra Tech 2006b, c). Field activities have been conducted in accordance with the approved QAPPS. A residential property screening form was completed at each residence where surface soil samples were collected and screened. All the samples were hand delivered to the EPA Region 7 laboratory. The data were validated by EPA Region 7 Quality Assurance personnel.

Soil Sampling

The field screening process entails delineating each residential property selected for screening into at least four cells. The cells radiate out 100 feet from the drip zone around the house or until the property line is reached, whichever is less. The maximum size of each cell is 100 feet by 100 feet. Additional areas or cells that can be screened include the drop zone; fine-grained material if used in driveways, sidewalks, or under carports; vegetable gardens; and children's play areas that are at least 25 feet by 25 feet. A composite sample consisting of nine aliquots, each collected from 0 to 2 inches bgs, is collected from

each cell and placed in a labeled, sealed plastic bag. All samples are transported to the sample preparation facility and placed in clean, dedicated aluminum pie pans. The samples are dried completely, homogenized, passed through a sieve, and then screened for lead using a XRF. An average of three readings are calculated and recorded on the field sheets. At least 10 percent of the screened soils samples are submitted to the EPA Region 7 laboratory for confirmation analysis.

Approximately 180 soil samples were collected between August and November 2006 for the PA and were submitted to the EPA Region 7 laboratory to be analyzed for arsenic, barium, cadmium, lead, and zinc. Each soil sample was collected in one 8-ounce jar. Samples were placed into a cooler containing ice, where they were stored at a temperature at or below 4 degrees Celsius (°C) pending submittal to the EPA Region 7 laboratory.

Arsenic was detected in 160 soil samples collected during the PA at concentrations exceeding arsenic's Superfund Chemical Data Matrix (SCDM) Cancer Risk (CR) screening concentration of 0.43 mg/kg, ranging from 5.91 mg/kg to 178 mg/kg. In addition, 32 of those samples had concentrations that exceeded the SCDM Reference Dose (RfD) screening concentration of 23 mg/kg for arsenic (EPA 2004). Barium and zinc were detected in all the soil samples at concentrations below their SCDM RfD screening concentrations of 5,500 mg/kg and 23,000 mg/kg, respectively (EPA 2004). Cadmium was detected in soil sample 3157-6 at a concentration of 45.4 mg/kg, which exceeds its RfD screening concentration. The remaining soil samples contained concentrations of cadmium below its RfD screening concentration of 39 mg/kg (EPA 2004). The lead concentrations for the soil samples collected during the PA are included in Attachment E. A total of 83 soil samples analyzed by the EPA Region 7 Laboratory contained lead concentrations exceeding its KDHE RSK Residential Soil Pathway value of 800 mg/kg, ranging in concentrations from 805 mg/kg to 8,390 mg/kg. These samples are listed in Table 1. In addition, 65 residential samples collected during the RSE contained concentrations of lead between 400 mg/kg and 800 mg/kg as shown in Table 2.

TABLE 1

**SUMMARY OF LABORATORY LEAD CONCENTRATIONS EXCEEDING KDHE RSK
RESIDENTIAL SOIL PATHWAY VALUE
UNITED ZINC – IOLA, KANSAS**

Sample Number	EPA Property ID	Date Collected	Lab Result (mg/kg)
3151-2	EPA #64, Cell 1	08/08/2006	907
3151-4	EPA #76, Cell 3	08/08/2006	817
3151-5	EPA #183, Cell 1	08/08/2006	1,440
3151-6	EPA #261, Cell 1	08/09/2006	805
3151-7	EPA #266, Cell 1	08/09/2006	1,660
3152-1	EPA #254, Cell 1	08/19/2006	946
3152-2	EPA #285, Cell 2	08/21/2006	991
3152-4	EPA #295, Cell 1	08/22/2006	1,200
3152-5	EPA #274, Cell 2	08/16/2006	1,640
3152-6	EPA #3, Cell 7	08/16/2006	838
3152-7	EPA #297, Cell 1	08/23/2006	1,140
3152-8	EPA #299, Cell 2	08/24/2006	1,130
3152-12	EPA #328, Cell 4	08/29/2006	1,050
3152-13	EPA #334, Cell 1	08/29/2006	1,050
3152-14	EPA #325, Cell 1	08/30/2006	1,010
3152-16	EPA #294, Cell 1	08/30/2006	996
3152-17	EPA #309, Cell 2	08/30/2006	2,010
3152-19	EPA #314, Cell 3	08/31/2006	1,270
3153-13	EPA #14, Cell 3	09/14/2006	1,690
3153-16	EPA #378, Cell 2	09/15/2006	1,050
3154-7	EPA #65, Cell 2	09/25/2006	1,480
3154-9	EPA #411, Cell 1	09/27/2006	1,280
3154-10	EPA #397, Cell 3	09/16/2006	1,390
3154-11	EPA #452, Cell 5	09/20/2006	1,380
3154-12	EPA #467, Cell 4	09/20/2006	857
3154-13	EPA #467, Cell 2	09/20/2006	1,040
3154-14	EPA #434, Cell 1	09/21/2006	916
3154-15	EPA #463, Cell 2	09/21/2006	1,140
3154-25	EPA #565, Cell 1	09/26/2006	1,410
3154-26	EPA #579, Cell 2	09/27/2006	1,500
3154-27	EPA #579, Cell 4	09/27/2006	839
3154-28	EPA #567, Cell 5	09/27/2006	1,190
3154-29	EPA #554, Cell 3	09/27/2006	916
3154-30	EPA #588, Cell 1	09/28/2006	970
3154-31	EPA #588, Cell 3	09/28/2006	1,690
3154-32	EPA #593, Cell 1	09/28/2006	2,520
3154-33	EPA #591, Cell 2	09/28/2006	1,230
3154-34	EPA #468, Cell 2	09/28/2006	1,010
3154-35	EPA #532, Cell 2	09/29/2006	1,920
3155-4	EPA #514, Cell 1	10/03/2006	908
3155-5	EPA #625, Cell 1	10/04/2006	993
3155-9	EPA #607, Cell 1	10/04/2006	1,410
3155-11	EPA #234, Cell 2	10/05/2006	6,430
3155-12	EPA #6010	10/05/2006	1,060
3155-14	EPA #662, Cell 3	10/05/2006	1,250
3155-15	EPA #621, Cell 1	10/06/2006	1,870
3155-17	EPA #658, Cell 1	10/09/2006	3,810

TABLE 1 (Continued)

**SUMMARY OF LABORATORY LEAD CONCENTRATIONS EXCEEDING KDHE RSK
RESIDENTIAL SOIL PATHWAY VALUE
UNITED ZINC – IOLA, KANSAS**

Sample Number	EPA Property ID	Date Collected	Lab Result (mg/kg)
3156-2	EPA #771, Cell 3	10/16/2006	3,620
3156-4	EPA #739, Cell 2	10/16/2006	1,260
3156-5	EPA #755, Cell 4	10/17/2006	1,230
3156-10	EPA #775, Cell 2	10/17/2006	1,410
3156-15	EPA #648, Cell 2	10/18/2006	1,360
3156-16	EPA #651, Cell 3	10/18/2006	1,780
3156-17	EPA #589, Cell 4	10/18/2006	1,360
3156-18	EPA #759, Cell 4	10/19/2006	1,570
3156-19	EPA #443, Cell 1	10/19/2006	3,110
3156-20	EPA #692, Cell 1	10/19/2006	1,470
3156-21	EPA #613, Cell 4	10/29/2006	3,070
3156-22	EPA #400, Cell 4	10/19/2006	1,360
3156-23	EPA #621, Cell 2	10/19/2006	842
3156-24	EPA #793, Cell 3	10/20/2006	831
3156-25	EPA #750, Cell 1	10/19/2006	861
3156-27	EPA 446, Cell 3	10/20/2006	921
3156-29	EPA #417, Cell 1	10/24/2006	2,270
3156-30	EPA #796, Cell 1	10/24/2006	1,050
3156-32	EPA #806, Cell 1	10/24/2006	2,100
3156-33	EPA #787, Cell 1	10/24/2006	825
3157-1	EPA #525, Cell 4	10/30/2006	2,040 J
3157-3	EPA #480, Cell 2	10/31/2006	824
3157-6	EPA #408, Cell 2	10/31/2006	8,390
3157-7	EPA #883, Cell 2	11/01/2006	871
3157-12	EPA #813, Cell 1	11/02/2006	950
3157-13	EPA #887, Cell 2	11/03/2006	1,120
3157-14	EPA #505, Cell 1	11/06/2006	1,520
3157-15	EPA #611, Cell 3	11/06/2006	3,980
3157-18	EPA #919, Cell 3	11/09/2006	1,320
3158-1	EPA #927, Cell2	11/13/2006	2,640
3158-2	EPA #931, Cell 2	11/15/2006	1,260
3158-5	EPA #975, Cell 2	NA	1,150
3158-8	EPA #968, Cell 5	11/27/2006	940
3158-9	EPA #957, Cell 3	11/28/2006	1,620
3158-10	EPA #958, Cell 2	11/28/2006	5,550
3158-11	EPA #998, Cell 1	11/29/2006	961

Notes:

EPA United States Environmental Protection Agency
ID Identification
J Identification of the analyte is acceptable; the reported value is an estimate
mg/kg Milligrams per kilogram
NA Not available
Number

TABLE 2
SUMMARY OF LABORATORY LEAD CONCENTRATIONS BETWEEN
400 mg/kg AND 800 mg/kg
UNITED ZINC – IOLA, KANSAS

Sample Number	EPA Property ID	Date Collected	Lab Result (mg/kg)
3151-01	EPA #270, Cell 2	8/15/2006	552
3151-03	EPA #102, Cell 2	8/8/2006	631
3151-09	EPA #268, Cell 2	8/9/2006	647
3152-03	EPA 298, Cell 1	8/22/2006	782
3152-10	EPA 287, Cell 1	8/25/2006	518
3152-11	EPA 281, Cell 1	8/28/2006	541
3152-15	EPA 326, Cell 3	8/30/2006	582
3152-20	EPA 315, Cell 1	8/31/2006	600
3153-01	EPA 373, Cell 1	9/6/2006	412
3153-04	EPA #392, Cell 1	9/11/2006	460
3153-05	EPA 333, Cell 1	9/11/2006	566
3153-07	EPA 344, Cell 2	9/12/2006	504
3153-08	EPA 346, Cell 2	9/12/2006	420
3153-10	EPA 356, Cell 1	9/12/2006	484
3153-11	EPA 255, Cell 1	9/12/2006	738
3153-12	EPA 354, Cell 1	9/13/2006	406
3153-14	EPA 394, Cell 1	9/14/2006	523
3153-15	EPA 337, Cell 1	9/14/2006	699
3153-17	EPA 341, Cell 1	9/15/2006	515
3154-02	EPA 414, Cell 4	9/18/2006	593
3154-03	EPA 408, Cell 3	9/19/2006	635
3154-04	EPA 396, Cell 1	9/19/2006	509
3154-06	EPA 558, Cell 2	9/25/2006	761
3154-08	EPA 541, Cell 2	9/25/2006	568
3154-16	EPA 404, Cell 1	9/21/2006	748
3154-17	EPA 433, Cell 1	9/21/2006	719
3154-18	EPA 406, Cell 1	9/21/2006	449
3154-22	EPA 547, Cell 4	9/26/2006	581
3154-23	EPA 387, Cell 3	9/26/2006	461
3155-03	EPA 515, Cell 1	10/3/2006	683
3155-06	EPA 234, Cell 3	10/4/2006	796
3155-08	EPA 610, Cell 1	10/4/2006	676
3155-10	EPA 659, Cell 1	10/5/2006	785
3155-13	EPA 664, Cell 1	10/5/2006	759
3155-16	EPA 553, Cell 6	10/6/2006	507
3155-18	EPA 720, Cell 1	10/10/2006	701
3155-19	EPA 710, Cell 5	10/10/2006	789
3155-26	EPA 725, Cell 1	10/12/2006	482
3155-27	EPA 717, Cell 1	10/12/2006	764
3155-31	EPA 694, Cell 1	10/12/2006	521
3155-33	EPA 699, Cell 2	10/13/2006	794
3156-01	EPA 729, Cell 1	10/16/2006	731
3156-03	EPA 748, Cell 1	10/16/2006	458
3156-07	EPA 746, Cell 1	10/17/2006	588
3156-08	EPA 753, Cell 1	10/17/2006	680

TABLE 2 (Continued)

**SUMMARY OF LABORATORY LEAD CONCENTRATIONS BETWEEN
400 mg/kg AND 800 mg/kg
UNITED ZINC – IOLA, KANSAS**

Sample Number	EPA Property ID	Date Collected	Lab Result (mg/kg)
3156-11	EPA 621, Cell 4	10/18/2006	466
3156-12	EPA 781, Cell 1	10/18/2006	515
3156-13	EPA 647, Cell 4	10/18/2006	420
3156-14	EPA 632, Cell 3	10/18/2006	746
3156-26	EPA 810, Cell 4	10/29/2006	774
3156-28	EPA 764, Cell 2	10/23/2006	559
3156-34	EPA 786, Cell 1	10/25/2006	599
3156-35	EPA 500, Cell 2	10/25/2006	503
3156-37	EPA 853, Cell 1	10/26/2006	529
3157-02	EPA 526, Cell 2	10/30/2006	662
3157-04	EPA 544, Cell 1	10/31/2006	726
3157-05	EPA 877, Cell 1	10/31/2006	542
3157-08	EPA 844, Cell 2	11/1/2006	748
3157-09	EPA 862, Cell 1	11/1/2006	505
3157-10	EPA 833, Cell 1	11/2/2006	674
3157-16	EPA 668, Cell 2	11/7/2006	665
3157-17	EPA 907, Cell 1	11/8/2006	687
3158-03	EPA 965, Cell 1	11/17/2006	426
3158-04	EPA 982, Cell 1	11/21/2006	483
3158-06	EPA 950, Cell 2	11/27/2006	526

Notes:

EPA United States Environmental Protection Agency
ID Identification
mg/kg Milligrams per kilogram
NA Not available
Number

SOIL EXPOSURE AND AIR PATHWAYS

Allen County is located within the Osage Plains and the land is dominantly level with few outstanding differences in the relief of the land. The U.S. Department of Agriculture (USDA) has classified soil in the area as Kenoma silt loam. The Kenoma soil type is described by the USDA as deep, moderately well-drained, very slowly permeable soils on the uplands. These soils are formed in material weathered from sediments high in content of silt and clay (USDA 1978).

United Zinc is located on approximately 17 acres of land within the city limits of Iola, Kansas. Most of the land is vacant, but the businesses currently on the property include: Brentagg Southwest, Inc., MFA, Superflea Flea Market, Tucker's Flea Market, and portion of a concrete plant (Maxim 2003, KDHE 2005). The area surrounding the former United Zinc facility is predominantly residential, and the

total population within the 4-mile target distance limit (TDL) from the center of the United Zinc property is approximately 8,076 people. Census information indicated 193 residents within 0.25 mile; 1,066 individuals between 0.25 and 0.5 mile; 2,222 people between 0.5 and 1 mile; 3,456 residents between 1 and 2 miles; 861 people between 2 and 3 miles; and 278 individuals between 3 and 4 miles from the United Zinc facility (Missouri Census Data Center 2005). In addition, five schools and two daycares are mixed in with the residential areas surrounding United Zinc.

Arsenic was detected in 160 soil samples collected during the PA at concentrations exceeding its SCDM CR screening concentration of 0.43 mg/kg, ranging from 5.91 mg/kg to 178 mg/kg. In addition, 32 of those samples had concentrations that exceeded the SCDM RfD screening concentration of 23 mg/kg for arsenic (EPA 2004). The background concentrations of arsenic ranged from 8 mg/kg to 13 mg/kg. Barium and zinc were detected in all the soil samples at concentrations below their SCDM RfD screening concentrations of 5,500 mg/kg and 23,000 mg/kg, respectively (EPA 2004). Cadmium was detected in soil sample 3157-6 at a concentration of 45.4 mg/kg, which exceeds its RfD screening concentration. The remaining soil samples contained concentrations of cadmium below its RfD screening concentration of 39 mg/kg (EPA 2004). The lead concentrations for the soil samples collected during the PA are included in Attachment E. A total of 83 soil samples analyzed by the EPA Region 7 Laboratory contained lead concentrations exceeding lead's KDHE RSK Residential Soil Pathway value of 800 mg/kg, ranging in concentrations from 805 mg/kg to 8,390 mg/kg. Background concentrations of lead identified northwest of the United Zinc facility ranged from 176 mg/kg to 397 mg/kg. Forty-four of those samples listed in Table 1 exceed three times the highest background concentration of lead.

No air pathway samples were collected because actual or potential contamination to the air migration pathway was not considered significant.

LIKELIHOOD OF EXPOSURE

An observed release to the soil exposure pathway was documented in one or more locations during the PA, resulting in a likelihood of exposure score of 550. This is based on arsenic and lead concentrations identified during the PA in residential surface soil samples exceeding the SCDM CR and RfD screening concentrations for arsenic and the KDHE RSK value of 800 mg/kg for lead. Historical operations at the facility include the former United Zinc and Chemical Company Zinc and Lead Smelter. Smelting operations have been documented to cause massive amount of pollution. Burning coal to operate the smelters created soot contaminated with elevated levels of arsenic, lead, cadmium, and zinc. In addition, these processes generated large volumes of solid waste, including impure smelting slag and slag blown

from retorts at the end of the smelting process. Most of the waste generated from these smelters was left after the operations ceased for future generations to address (KDHE 2006).

WASTE CHARACTERISTICS

Hazardous waste quantity and toxicity as related to the soil exposure pathway are discussed in this section. For this scenario, arsenic and lead-contaminated soil was documented in the soils at United Zinc. The smelter waste quantity was estimated at 1,800 cubic yards which equals 16,200 square feet assuming a height of 3 feet, and the total area of the contaminated soil quantity was estimated to be 38,279,271 square feet. To calculate the area of the smelter waste the pile size was divided by 34 and the area of the contaminated soil was calculated by dividing the total by 34,000. The Hazardous Waste Quantity total for the smelter waste and contaminated soil equaled 1,601 square feet, and a Hazardous Waste Quantity Factor Value (HWQFV) of 100 was assigned based on the HRS rule Section 2.4.2.2 (EPA 1990).

The driving hazardous constituent for the soil exposure pathway is lead. A toxicity value was based on SCDM factor table (EPA 2004). A toxicity factor value of 10,000 was assigned for lead (EPA 2004) based on Table 3-9 in the HRS Rule (EPA 1990). A HWQFV of 100 was assigned based on the area of the smelter waste and contaminated soil at United Zinc. Given a toxicity factor of 10,000 and a HWQFV of 100, the waste characteristics (WC) value of 32 was assigned based on Table 2-7 in the HRS Rule (EPA 1990).

SOIL EXPOSURE TARGETS

This section discusses target factor values for the soil exposure pathway, including the resident individual, resident population, workers, resources, and terrestrial sensitive environments.

United Zinc is located on approximately 17 acres of land within the city limits of Iola, Kansas. Much of the land is vacant, but the businesses currently on the property include: Brentagg Southwest, Inc., MFA, Superflea Flea Market, Tucker's Flea Market, and portion of a concrete plant. Beyond those commercial properties, the area surrounding the former United Zinc facility is predominantly residential. In addition, five schools and two daycares are mixed in with the residential areas surrounding United Zinc.

Resident Individual

Based on the HRS Rule, a score of 45 was assigned because people are living and/or attending school or daycare on or within 200 feet of contaminated soil. The contaminated soil documented during the PA sampling is considered Level II contamination since it exceeds the KDHE RSK values.

Resident Population

Lead-contaminated soil exceeding the KDHE RSK Residential Soil Pathway value of 800 mg/kg was identified in 83 residential yards during the PA. To calculate the resident population exposed to Level II contamination, the 83 residential samples exceeding the 800 mg/kg value was multiplied by the average number of persons per household in Allen County, 2.43. In addition, the grassy area surrounding two of the school yards sampled exceeded the KDHR RSK value of 400 mg/kg. The schools included the Jefferson Elementary School and the McKinley Elementary School. The enrollment at Jefferson is 224 students and at McKinley is 142 students (Great Schools 2007). The student population of these schools was added to the number of households whose residential yard samples exceeded the benchmark discussed above. The total Level II population is 567.69.

Workers

This factor value was assigned a score of 5 because there are workers with workplaces located on or within 200 feet of an area of observed contamination. The total number of workers is unknown; therefore, a value of 5 was assigned because the number of workers is known to exceed at least 1. The former United Zinc facility includes the following businesses: Brenntag Southwest, Inc. (Chemical Distribution Company), a MFA Distributor, the Superflea Flea Market, Tucker's Flea Market, a portion of a concrete mixing facility, and some pastureland. The facility is also surrounded by additional active businesses.

Resources

This factor value was assigned a score of 0 because no known commercial agriculture, silviculture, livestock production, or commercial livestock grazing is present on an area of observed contamination at United Zinc.

Terrestrial Sensitive Environments

This factor value was assigned a score of 0. Although several federally endangered and threatened species are listed as for Allen County by the Kansas Department of Wildlife and Parks (KDWP) (KDWP 2007), these have not been documented at the former United Zinc facility.

Soil and Air Pathways Conclusions

The likelihood of exposure value was assigned a value of 550 based on a release to the soil. This is based on arsenic and lead concentrations, identified during the PA in residential surface soil samples, exceeding

the SCDM CR and RfD screening concentrations for arsenic and the KDHE RSK value for lead. Lead was the primary contaminant of concern during the field screening process during the PA. Therefore, lead was used to score the United Zinc site. Lead was detected at concentrations in 83 residential yards exceeding the KDHE RSK Residential Soil Pathway value of 800 mg/kg. The HWQFV was assigned a value of 100 based on the hazardous substance (lead) documented as present. A toxicity factor of 10,000 was assigned based on the hazardous constituent (lead) documented. Therefore, a waste characteristics value of 32 was assigned. The site was scored based on resident individual, resident population, potential targets, and workers.

The resident individual was assigned a score of 45 based on residents living or attending school or daycare on or within 200 feet of Level II contamination. The Level II target population is 567.69, computed by summing: (1) the product of the number of residential soil samples collected that exceed the KDHE RSK value times the average number of persons per household in Allen County plus (2) the student body total for both Jefferson Elementary School and the McKinley Elementary School. The workers factor was assigned a value of 5, the resources factor was assigned a value of 0, and the terrestrial sensitive environment was assigned a value of 0. This resulted in a targets factor category score of 617.69. Based on the likelihood of exposure, waste characteristics, and targets values, the site was assigned a groundwater migration pathway score of 100.

GROUNDWATER AND SURFACE WATER PATHWAYS

No groundwater samples were collected as part of the PA activities. The primary water source of drinking water for the City of Iola is surface water (EPA 2007). According to the Kansas Geological Survey database, approximately 109 registered wells are within 4 miles of the former United Zinc smelter facility; however, only eight domestic wells are listed as active (Kansas Geological Survey 2007).

Surface water runoff from United Zinc enters Rock Creek, which is located east of the former smelter property. Rock Creek drains into the Neosho River southwest of the United Zinc facility. Based on the analytical results from the Phase II FFSA, no additional surface water and sediment samples were collected as part of the PA.

SUMMARY AND CONCLUSIONS

This site generated a preliminary overall score of 50, based on documented lead-contaminated soils. In 83 residential yards during the PA, lead was detected at concentrations exceeding its KDHE RSK

Residential Soil Pathway value of 800 mg/kg; lead was detected above its KDHE RSK value of 400 mg/kg at two schools.

PRE-REMEDIAL CONSIDERATIONS

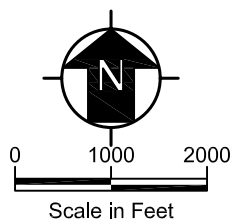
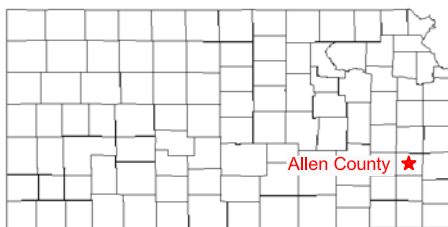
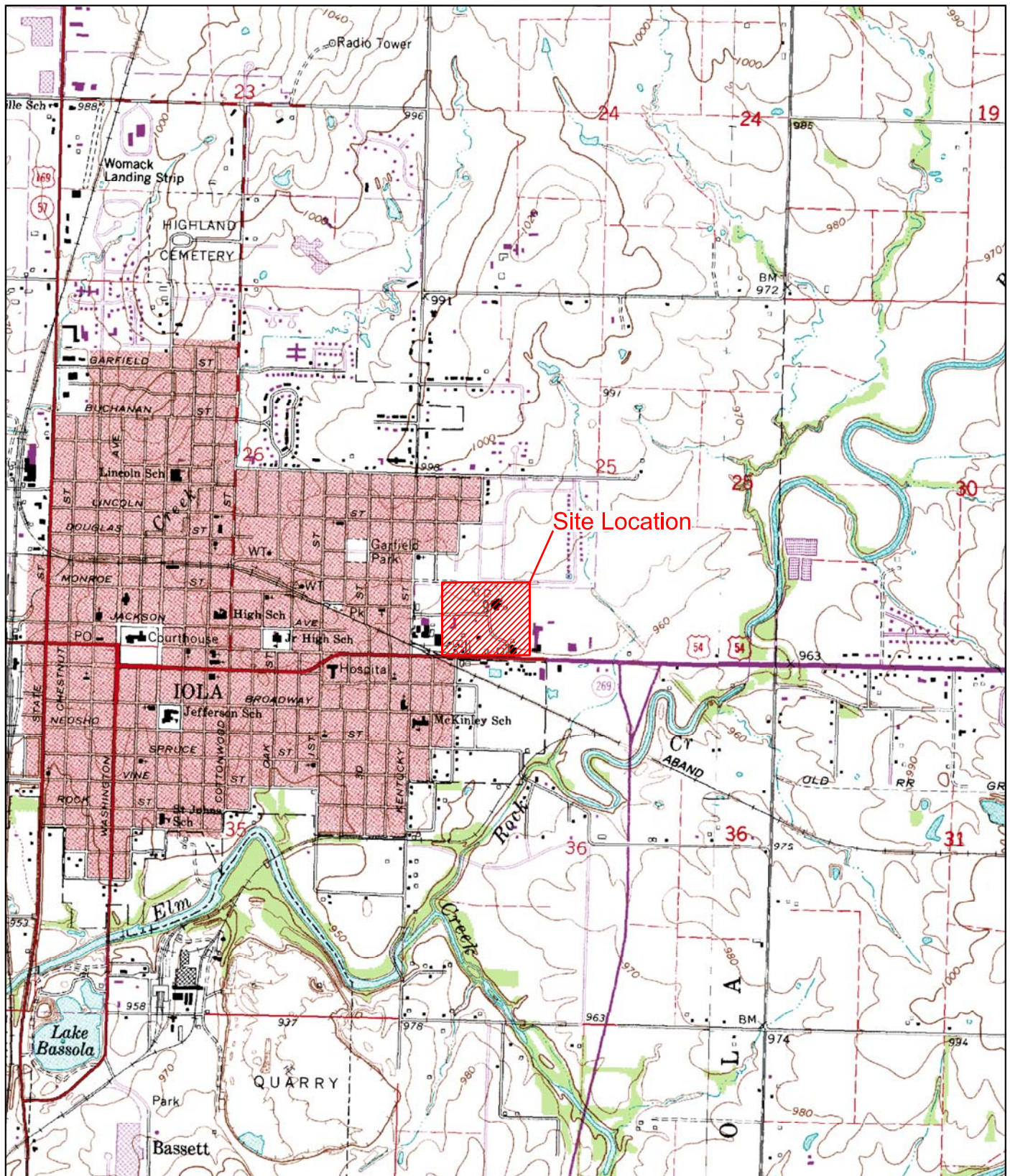
Tetra Tech is currently performing ongoing RA and RSE investigations, including screening residential properties for possible soil contamination. Residential property screening forms are completed at each residence where surface soil samples are collected and screened. Further residential screening is recommended for United Zinc to determine the extent of contaminated soil surrounding the former United Zinc facility, and to identify residential yards that contain contaminated soil with time-critical removal action levels. The residential yards identified to contain levels of lead between 400 mg/kg and 800 mg/kg will be noted during the screening activities and will be addressed after most if not all of the residential yards that contain time-critical removal actions are cleaned. All of the sensitive environments including schools, daycares, and parks will also be addressed during the removal if they contain time-critical removal levels of lead. There may be a few industrial properties that will not be addressed during the removal due to statutory limitations on the removal authority.

REFERENCES

- Burns & McDonnell Engineering Company Inc. (Burns & McDonnell). 2004. Phase II Focused Former Smelter Assessment of the Former United Zinc #1 Smelter in Iola, Kansas. December.
- Great Schools. 2007. The Parent's Guide to K-12 Success. On-line Address: <http://www.greatschools.net/schools>. Accessed: February 2, 2007.
- Kansas Department of Health and Environment (KDHE). 2003. Risk-Based Standards for Kansas Manual. March 1.
- KDHE. 2005. Preliminary Removal Site Evaluation for United Zinc Smelter #1 Site in Iola, Kansas. September.
- KDHE. 2006. Bureau of Environmental Remediation/Remedial Section – A Short History of the Zinc Smelting Industry in Kansas. December 28.
- Kansas Department of Wildlife and Parks (KDWP). 2007. Threatened and Endangered Species in Allen County. On-line Address: <http://www.kdwp.state.ks.us>. Accessed: February 2, 2007.
- Kansas Geological Survey (KGS). 2007. KGS Index of Water Wells Database. Last updated January 1, 2007.
- Missouri Census Data Center. 2005. MABLE/Geocorr2K: Geographic Correspondence Engine with Census 2000 Geography. Version 1.2. On-line Address: <http://mcdc2.missouri.edu/websas/geocorr2k.html>. Accessed: January 16, 2007. Last updated: January 2007.
- Maxim Technologies, Inc. 2003. Focused Former Smelter Phase I Report. Group B Smelters. United Zinc #1 in Iola, Kansas. December 19.
- Terranext. 2005. Residential Yard Soil Sampling Report for United Zinc #1 in Iola, Kansas. June 27.
- Tetra Tech EM Inc. (Tetra Tech). 2006a. Removal Site Evaluation Report for United Zinc #1 Site. September 26.
- Tetra Tech. 2006b. Quality Assurance Project Plan for Integrated Site Assessment of the United Zinc #1 Site in Iola, Kansas. April 7.
- Tetra Tech. 2006c. Quality Assurance Project Plan for Removal Action of the United Zinc #1 Site in Iola, Kansas. August 10.
- United States Department of Agriculture. 1978. Soil Survey of Allen County, Kansas. November.
- U. S. Environmental Protection Agency (EPA). 1990. Hazardous Ranking System Final Rule, 40 CFR Part 300. December.
- EPA. 2004. Superfund Chemical Data Matrix (SCDM) Table. Washington, D.C. January.
- U.S. Geological Survey (USGS). 1984. Iola, Kansas, 7.5-minute topographic quadrangle.

APPENDIX A

FIGURES



United Zinc Lead Site
Iola, Kansas

Figure 1
Facility Location Map



Tetra Tech EM Inc.

Source: USGS Allen County, KS 7.5 Minute Topo Quad, 1959, PR 1984

Date: 01/17/07

Drawn By: Bill Spilking

Project No: I9004.L06.0038.000

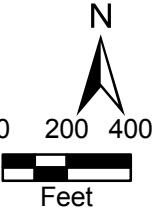
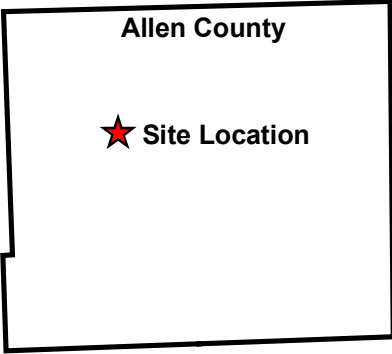


- Legend
- Schools
 - Slag Pile
 - Highway
 - Major Road
 - Local Road
 - Minor Road
 - Other Road
 - Property Boundary

County Locator



Site Locator



Source: Allen Co., Kansas DOQQ Tileset, 2003
Street Maps USA-ESRI Media Kit, 2001-2005
MAXIM Technologies Inc. Figure 2 (Group B Lead Smelters), 2003

United Zinc Lead Site
Lola, Kansas

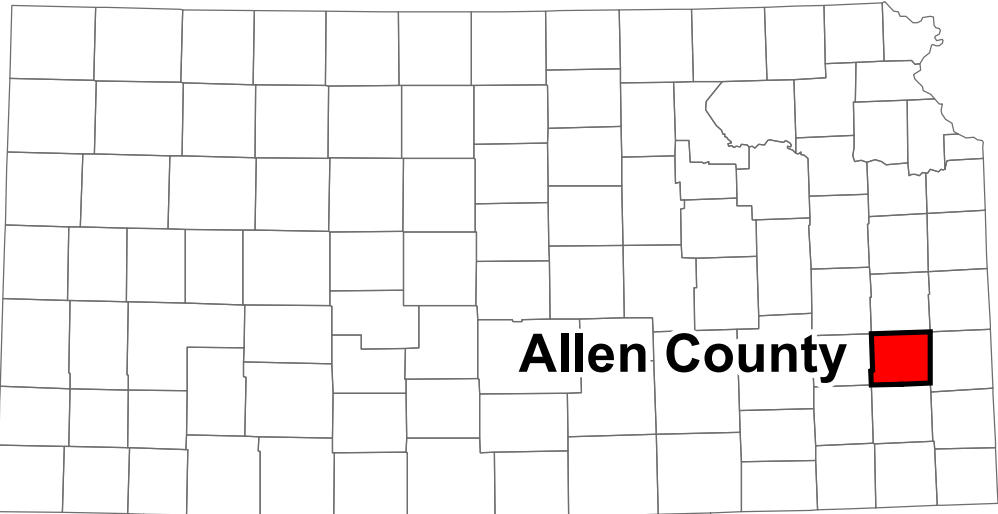
Figure 2
Facility Map





- Legend
- Background Sample Location
 - Sample Location
 - Highway
 - Major Road
 - Local Road
 - Minor Road
 - Other Road
 - ▭ Property Boundary

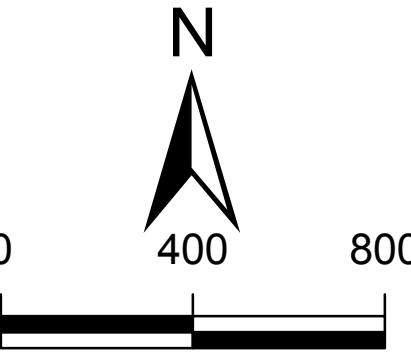
County Locator



Site Locator

Allen County

★ Site Location

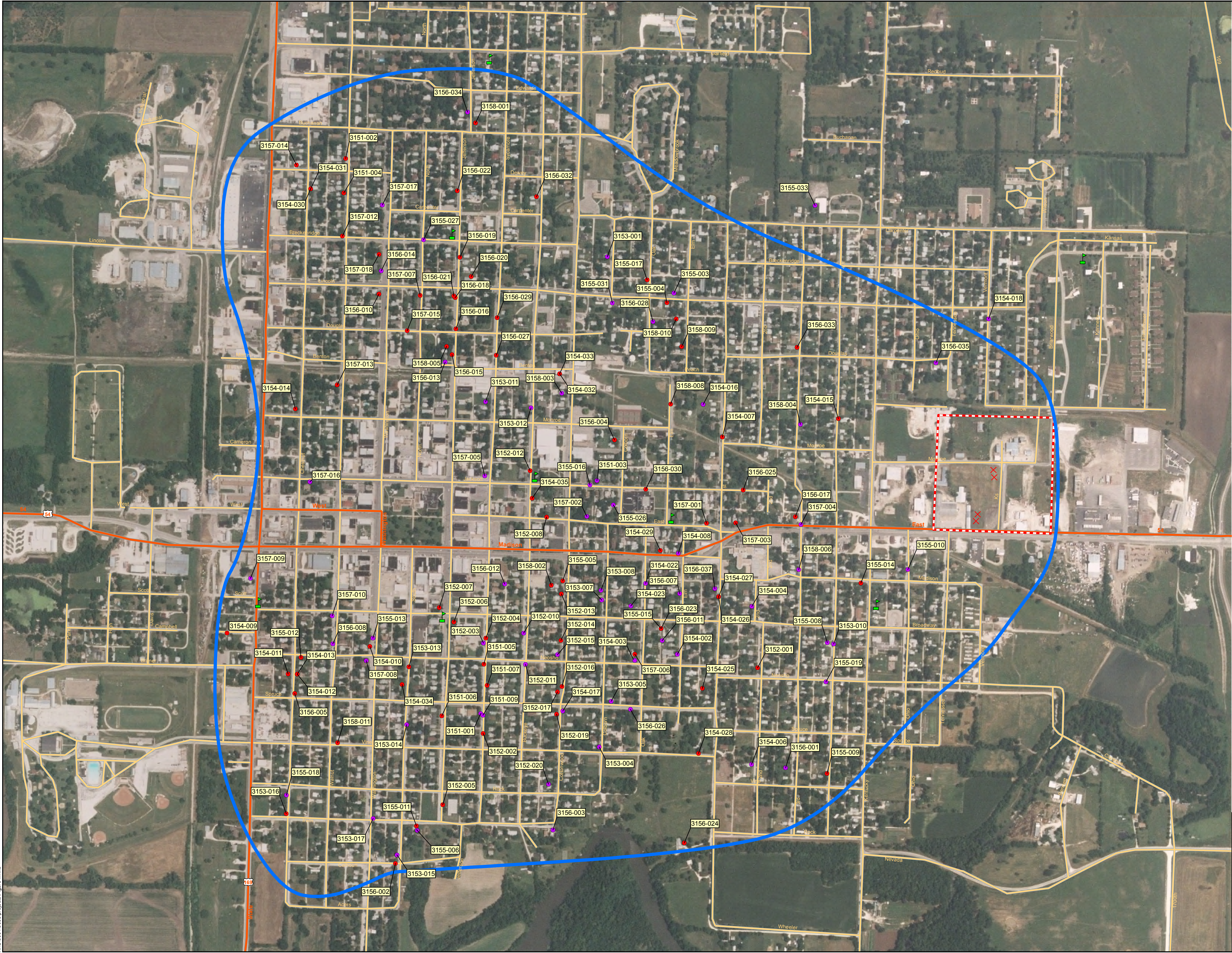


Scale in Feet
Source: Allen Co., Kansas DOQQ Tileset, 2003
Street Maps USA-ESRI Media Kit, 2001-2005

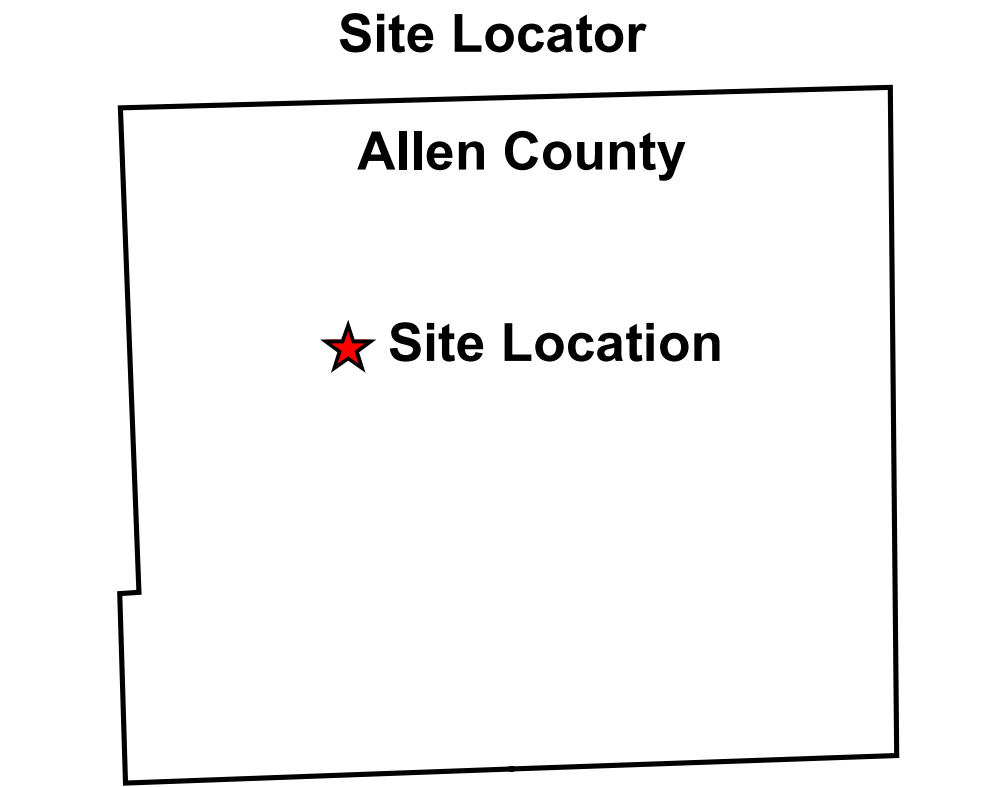
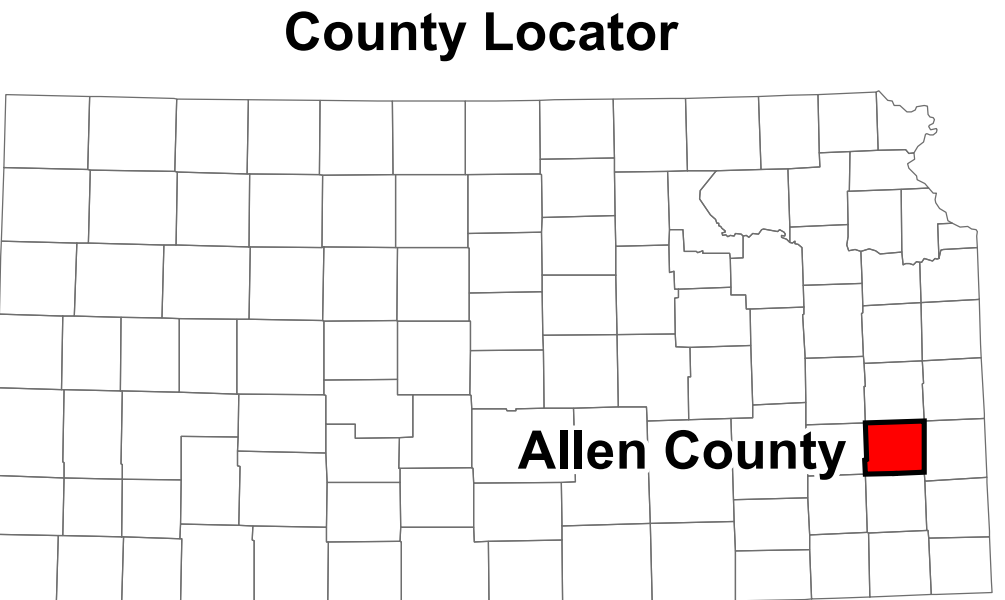
United Zinc Lead Site
Iola, Kansas

Figure 3
Sample Location Map





- Legend**
- Schools
 - Lead Results between 400-800 mg/kg
 - Lead Results > 800 mg/kg
 - Slag Pile
 - Contaminated Soil Boundary
 - Property Boundary
 - Highway
 - Major Road
 - Local Road
 - Minor Road
 - Other Road



Scale in Feet

0 400 800

Source: Allen Co., Kansas DOQQ Tileset, 2003
Street Maps USA-ESRI Media Kit, 2001-2005

United Zinc Lead Site
Iola, Kansas

Figure 4
Lead Concentrations Exceeding KDHE
Risk Residential Soil Pathway Value

APPENDIX B

QUICKSCORE VERSION 2.3 SCORESHEETS

****** CONFIDENTIAL ******
******PRE-DECISIONAL DOCUMENT ******
****** SUMMARY SCORESHEET ******
****** FOR COMPUTING PROJECTED HRS SCORE ******

****** Do Not Cite or Quote ******

Site Name: United Zinc Smelter No. 1 Region: 7
 City, County, State: Iola, Allen County KS Evaluator: Stephanie Luebbering
 EPA ID#: KSN000705026 Date: 1/26/2007
 Lat/Long: 37.9222800 N / 95.385900 W T/R/S: 24S / 18E / 25&36
 Congressional District:
 This Scoresheet is for: PA
 Scenario Name: United Zinc in Iola, Kansas
 Description:

	S pathway	S ² pathway
Ground Water Migration Pathway Score (S _{gw})		
Surface Water Migration Pathway Score (S _{sw})		
Soil Exposure Pathway Score (S _s)	100	10000
Air Migration Score (S _a)		
$S_{gw}^2 + S_{sw}^2 + S_s^2 + S_a^2$		10000
$(S_{gw}^2 + S_{sw}^2 + S_s^2 + S_a^2)/4$		2500
$\sqrt{(S_{gw}^2 + S_{sw}^2 + S_s^2 + S_a^2)/4}$		50

* Pathways not assigned a score (explain):

TABLE 5-1 --SOIL EXPOSURE PATHWAY SCORESHEET

Factor categories and factors	Maximum Value	Value Assigned
Likelihood of Exposure:		
1. Likelihood of Exposure	550	550
Waste Characteristics:		
2. Toxicity	(a)	10000
3. Hazardous Waste Quantity	(a)	100
4. Waste Characteristics	100	32
Targets:		
5. Resident Individual	50	45
6. Resident Population:		
6a. Level I Concentrations	(b)	0
6b. Level II Concentrations	(b)	567.69
6c. Population (lines 6a + 6b)	(b)	567.69
7. Workers	15	5
8. Resources	5	0
9. Terrestrial Sensitive Environments	(c)	0
10. Targets (lines 5 + 6c + 7 + 8 + 9)	(b)	617.69
Resident Population Threat Score		
11. Resident Population Threat Score (lines 1 x 4 x 10)	(b)	10871344
Nearby Population Threat		
Likelihood of Exposure:		
12. Attractiveness/Accessibility	100	
13. Area of Contamination	100	
14. Likelihood of Exposure	500	0
Waste Characteristics:		
15. Toxicity	(a)	
16. Hazardous Waste Quantity	(a)	
17. Waste Characteristics	100	0
Targets:		
18. Nearby Individual	1	
19. Population Within 1 Mile	(b)	
20. Targets (lines 18 + 19)	(b)	0
Nearby Population Threat Score		
21. Nearby Population Threat (lines 14 x 17 x 20)	(b)	0
Soil Exposure Pathway Score:		
22. Pathway Score ^d (S _e), [(lines (11+21)/82,500, subject to max of 100]	100	100

^a Maximum value applies to waste characteristics category

^b Maximum value not applicable

^c No specific maximum value applies to factor. However, pathway score based solely on terrestrial sensitive environments is limited to a maximum of 60

^d Do not round to nearest integer